

**SUMMARY OF RESEARCH
FINAL REPORT**

Title: ULTRASONIC SCANNER CONTROL AND DATA ACQUISITION
Type of report: Final

Name of principal investigator: John Hemann

Period covered by grant: 11/4/97 to 12/31/02

Name and address if the grantee's institution: Cleveland State University
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Grant number: NCC 3-581

SUMMARY OF RESEARCH

The research accomplishments under this grant were very extensive in the areas of **ULTRASONIC SCANNER CONTROL AND DATA ACQUISITION**. Rather than try to summarize all this research I have enclosed research papers and reports which were completed with the funding provided by the grant. These papers and reports are listed below:

1. Abdul-Aziz, A., Baaklini, Y. G. and Jeffrey Trudell; ***"Structural Analysis of Composite Flywheels: An Integrated NDE and FEM Approach"*** NASA Technical Memorandum No. 2001-210461. January 2001.
2. Abdul-Aziz, A., Baaklini, Y. G. and Jeffrey Trudell; ***"An Integrated NDE and FEM Characterization of Composite Rotors"*** Proceedings, SPIE's 6th International Symposium on Nondestructive Evaluation and Health Monitoring of Aging Infrastructure, 5-9 March 2001, Newport Beach, California USA.
3. Baaklini, Y. G., H. E. Kautz, A. L. Gyekenyesi, Abdul-Aziz, A and R. E. Martin; ***"NDE for Material Characterization in Aeronautic and Space Applications"*** NASA Technical Memorandum No. 2001-210474. December 2000.
4. Abdul-Aziz, A., Baaklini, Y. G. and R. T. Bhatt ; ***"Design Evaluation Using Finite Element Analysis of Cooled Silicon Nitride Plates for a Turbine Blade Application"*** Proceedings of 103 Annual Meeting and Exposition, The American Ceramic Society , Indianapolis, Indiana, April 22-25, 2001. Also published as a NASA TM-2001210819, June 2001.
5. Lerch, B.A, Draper, S.L., Baaklini, G.Y., Pereira, M., and Austin, C.M., **"Effect of defects on the Fatigue Life of TiAl,"** HITEMP, May, 1999
6. Richard E. Martin and George Y. Baaklini. **"Scanning Ultrasonic Spectroscopy for Composite Flywheels"**, Presented at SPIE 6th. Annual International Symposium on NDE for Health Monitoring and Diagnostics, March 4-8, 2001, Newport Beach, CA.
7. Baaklini, G.Y. and Tucker, J.R., **"Ultrasonic Spectroscopy of RLV Composites and Comparison with Computed Tomography,"** Fifth International Conference on Composites Engineering, Edited by David Hui, pp 897-899, July 1998
8. Baaklini, G.Y. and Koenig, J.R., **"NDE Reference Standards for RLV Aerospace Composites,"** Fifth International Conference on Composites Engineering, Edited by David Hui, pp 49-52, July 1998
9. Lang, J., Sankar, J., Kellar, J., Baaklini, G.Y. and Lua, J., **"Behavior of SiC/SiC Woven Composite Under Tensile and Fatigue Loading Conditions,"** Fifth

International Conference on Composites Engineering, Edited by David Hui, pp 513-515, July 1998.

10. Harmon, L.M. and Baaklini, G.Y., "**Ultrasonic Spectroscopy of Composite Rims for Flywheel Rotors,**" Review of Progress in Quantitative Nondestructive Evaluation, Vol. 21, July, 2001. Eds. Donald Thompson and Dale Chimenti.

11. Abdul-Aziz, A. and Baaklini, Y.G.; "**Challenges in Integrating Nondestructive Evaluation and Finite Element Methods for Realistic Structural Analysis**". Materials Evaluation, Journal of the American Society for Nondestructive Testing. Published, April 2002.

12. Harmon, L. M., and Baaklini, G.Y., "**Ultrasonic Resonance Spectroscopy of Composite Rings for Flywheel Rotors.**" **Nondestructive Evaluation of Materials and Composites,**" Proceedings of SPIE Vol. 4336. Eds. George Y. Baaklini, Eric C. Boltz, Steven M. Shepard, and Peter J. Skull. Bellingham, WA: SPIE, 2001. NASA TM--2001-210960.

13. Roth, D.J., Carney, D.V., Baaklini, G.Y., Bodis, J.R. and Rauser, R.W., "**Scaling up the Single Transducer Thickness Independent Ultrasonic Imaging Method for Accurate Characterization of Microstructural Gradients in Monolithic and Composite Tubular Structures,**" NASA/TM--1998-206625, February 1998